E 6452

00006452

Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MAY 2024

Fourth Semester

Core Course—OPERATING SYSTEMS

(For B.Sc. Computer Science)

[2013 to 2016 Admissions]

Time : Three Hours Maximum : 80 Marks

Part A

Answer **all** *questions.*
Each question carries 1 *mark.*

1. Recall the use of Fork and Exec System Calls.
2. Define Process.
3. Explain Page Fault.
4. What is the primary function of an Operating System as a Resource Manager ?
5. What does POST stand for in the boot process ?
6. What is batch processing in the context of an Operating System ?
7. Name one method of interprocess communication (IPC).
8. What is virtual memory ?
9. Explain page fault.
10. Discuss LRU.

(10 × 1 = 10)

Part B

Answer any **eight** *questions.*
Each question carries 2 *marks.*

11. What is the kernel in an Operating System ?
12. What is the function of bootstrapping in the Operating System startup process ?
13. What is the purpose of a semaphore in process synchronization ?
14. Briefly describe process scheduling and its importance.
15. Differentiate between paging and segmentation.

Turn over

16. List the operations that can be performed on directory.
17. Describe the role of a device driver in an OS.
18. Describe a situation where the Readers-Writers Problem might occur in real-world applications.
19. What do you mean by CPU scheduling ? Discuss CPU/IO burst cycle.
20. State the advantages of multiprocessors.
21. Define the term Waiting time and Turnaround time in reference to scheduling algorithms.
22. Differentiate between batch processing and real-time processing.

(8 × 2 = 16)

Part C

Answer any **six** *questions.*
Each question carries 4 *marks.*

23. Explain the concept of a process and the different states a process can be in.
24. What is deadlock prevention, and how does it differ from deadlock avoidance ?
25. Explain the concept of segmentation with paging and discuss its advantages in operating systems.
26. Explain Best Fit algorithm.
27. What is a File ? Describe the attributes of a file.
28. What are the two types of the Readers-Writers Problem?
29. Explain the difference between safe and unsafe states in the Banker's Algorithm.
30. Discuss the role of each matrix (Max, Allocation, Need) in the Banker's Algorithm and how they interact with one another.
31. Differentiate between the following :
    (a) Paging and Segmentation.
    (b) Page table and segment table.

(6 × 4 = 24)

Part D

Answer any **two** *questions.*
Each question carries 15 *marks.*

32. Explain the different types of Operating Systems (Batch Processing, Multi-programming, Multi-user, and Real-time systems) and discuss their unique characteristics, advantages, and use cases.
33. Discuss the concept of deadlocks in Operating Systems. Explain the strategies for deadlock prevention, avoidance, and detection with examples of each.

34. Suppose a process has the following sequence of page requests: 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5. The system uses a page frame size of 3 pages :

    (a) Using the Least Recently Used (LRU) page replacement algorithm, determine the number of page faults.

    (b) Using the First-In-First-Out (FIFO) page replacement algorithm, calculate the number of page faults.

35. Consider the following set of processes, with their arrival times and burst times given. Use the Shortest Job First (SJF) scheduling algorithm to determine the average waiting time :

Process	Arrival Time	Burst Time
P1	0	8
P2	1	4
P3	2	9
P4	3	5

    (a) Draw a Gantt chart for the SJF scheduling algorithm.

    (b) Calculate the waiting time for each process.

    (c) Find the average waiting time for this set of processes.

(2 × 15 = 30)